AMENDMENT

SPECIFICATION

Rewrite paragraphs [001], [004], [0019], [0021], [0023] and [0024] as follows:

[001] The present invention relates to a new apparatus and method for providing vapor free liquid to an anhydrous ammonia flow control system. More particularly, the invention relates to a process which removes gaseous ammonia from the liquid stream and provides a static head pressure differential at the inlet of the flow control system. The static head causes anhydrous ammonia at the inlet to have an absolute pressure above its saturation pressure.

[004] A typical use of refrigeration is described in U.S. Patent No. 4,458,609 to Tofte. A part of the liquid ammonia is used as a refrigerant to cool the inlet liquid stream. This is accomplished in a heat exchanger which mechanically separates the stream of inlet liquid ammonia from a stream of coolant ammonia. Typically, the coolant stream taken from the main stream passes through a restriction, losing pressure. The lower pressure, lower temperature stream provides the cooling for the inlet liquid ammonia.

[0019] The storage tank 105 is a pressurized tank that is commercially available and retains a predetermined quantity of fertilizer which may be, by way of illustration, anhydrous ammonia. The storage tank 105 is on a trailer that also has a tongue 120 that is pivotally connected to a hitch 122 on the toolbar applicator frame 101.

[0021] Vapor rises to the top of the separation chamber quieting section 214 and exits through a float operated gas vent valve body 215. Gas vent valves are commercially available. However, the valve described below is a new design. Typically, the float operates on a hinged lever which closes an orifice located part way between the float and the hinge. When the force exerted by the pressure difference across the orifice exceeds the net force caused by the weight of the float acting on its lever arm, the valve will stick in a closed position, allowing no gas to pass. Typically, this problem is solved by the use of a very small orifice. However, a small orifice is typically inadequate to exhaust the total gas generated. This causes gas to build up in the separation chamber until it finally reaches the pump inlet, starving the pump. The valve design described here avoids use of an orifice. With this design there is no pressure differential creating a force to hold the valve in its closed position. The valve consists of a housing 301, a spool 302, and a float 303. When the level of liquid ammonia drops, the float 303 drops also. The spool 302 is rigidly attached to the float 303 and moves as the level of liquid ammonia changes. Travel of the spool 302 is limited by the drive pin 304 through the spool which bottoms at the end of slot 306 in the housing 301. In this position, the top of the spool 302 is below the gas exit passage 305 so gas flows through the exit passage 305 and out of the separation chamber 214. As gas leaves the separation chamber 214 the liquid level rises, raising the float 303. As the float 303 rises, it raises the spool to cover the exit passage 305 stopping flow. This prevents liquid ammonia from exiting the separation chamber.

[0023] Liquid ammonia flows down inside the separation chamber 102 through a static head pipe 219 and exits the chamber to a suitable flow control system 103. It is possible to create a vortex in the separation chamber 102 whereby ammonia gas can be conveyed to the inlet to the flow control system. To prevent a vortex, a baffle 211 is placed in the quieting zone 214 below the inlet 212 to the separation chamber 102. An increase in liquid pressure at the exit 229 of the separation chamber 102 is caused by the weight of liquid ammonia in the quieting zone 214 and the static head pipe or standpipe 219. This pressure increase raises the pressure of the liquid above saturation pressure. The quiet section or quiet zone 214 has an area perpendicular to a flow of liquid ammonia through the quieting section that is at least two times the entry passage 212 area. The standpipe 219 has a standpipe ammonia flow path cross-section area that is smaller than the quieting section area.

[0024] The flow control system 103 would preferably include a positive displacement pump 220, such as of the type manufactured under model 1502 or model 7560 by Hypro Corporation of New Brighton, Minnesota. In the preferred embodiment, the pump 220 is driven by a Char-Lynn hydraulic motor, model 101-1700, using tractor hydraulics. Following the pump 220 is a side stream with a pressure relief valve 221 which limits over pressurization of the system downstream from the pump 220. Any effluent from the pressure relief valve 221 flows through a hose 228 to the inlet 212 of the separation chamber 102. Pressure is monitored by a pressure gauge 213. A flow sensor 222 is connected to a console/controller in the cab of the tow vehicle 100 so that the operator of the tow vehicle 100 can monitor and control the flow of ammonia through a servo valve 223. Following the servo valve 223 the liquid ammonia flows to one or more

hydraulically operated shut off valves 224. After each shut off valve 224 is a manifold exit, to each knife 104, that includes an orifice 226. Each orifice 226 creates a backpressure on the flow controls system 103, maintaining the ammonia at a pressure above its saturation pressure. The orifices 226 provide equal flow to each knife line. Flexible hoses 227 connect these lines from the manifold 225 to the knives 104.